

EVANIIDAE (HYMENOPTERA) IN THE MID-ATLANTIC STATES: SEASONAL OCCURRENCE AND IDENTIFICATION

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Abstract.—Six species of Evaniidae are found in the mid-Atlantic states. *Evania appendigaster* (L.) and *Prosevania fuscipes* (Illiger) are introduced species and are found only in urban situations. *Evaniella semaeoda* Bradley, *Hyptia harpyoides* Bradley, *H. thoracica* (Blanchard), and *H. reticulata* (Say) are native and are widely distributed and common in field collections. The peak flight time for all four native species is similar, from late June to the end of July, but they are present in low population levels into September. A key, supplemented with scanning electron photographs, is given for identification of the species.

Key Words: Evaniidae, ensign wasps, key, seasonal occurrence, Delaware, Maryland, Virginia, West Virginia

Six species of Evaniidae, known as ensign wasps, occur in the mid-Atlantic states, here defined as Delaware, District of Columbia, Maryland, West Virginia, and Virginia. All are egg parasitoids of cockroaches. During 15 years of Malaise trapping in this area, I have collected about 7000 specimens and, based on this trapping, can determine the seasonality and distribution of the species. I also provide a key and SEM photographs for species identification.

Two biological groups are apparent. One includes two introduced species, *Evania appendigaster* (L.) and *Prosevania fuscipes* (Illiger), both of which are found only in buildings in urban areas. I have never taken these species in field collections. The other four species, *Evaniella semaeoda* Bradley, *Hyptia harpyoides* Bradley, *Hyptia thoracica* (Blanchard), and *Hyptia reticulata* (Say), are native, widely distributed, and

most are common in field collections in Malaise traps throughout the area.

All native species have a similar flight period. The first individuals appear at the end of May or beginning of June. The peak flight time is from the end of June to the end of July. Thereafter a rapid decline in populations occurs, and only a few specimens are found in August, September, and the early part of October. The flight pattern indicates a single generation annually for each species in the mid-Atlantic states.

Identification of some species, especially those of *Hyptia*, are based on sculpture of the head and thorax. There have not been adequate illustrations accompanying previous keys to show these differences. Consequently, I present scanning electron photographs of the head and thorax sculpturation to aid in identification. The size of the eyes and sculpturation of parts of the thorax

are additional characters used for the first time in a key to separate *Hyptia* species.

Deyrup and Atkinson (1993) studied the evaniid composition and seasonality at the Archbold Biological Station, Highlands, Co., Florida. They found *Evaniella semaeoda*, *Hyptia floridana* Ashmead, *H. reticulata*, and *H. thoracica*. *Hyptia floridana* was not found in this study, and *H. harpyoides* Bradley, very common in the mid-Atlantic region, was not found in their study. The other three species are common to both areas and their flight times are compared.

Most of the biological work has been done with the two introduced species which parasitize household cockroaches. Thoms and Robinson (1986, 1987) discussed the feasibility of one species, *Prosevania fuscipes* (as *P. punctata* (Brullé)), as a natural control agent for cockroaches in Virginia, and Edmunds (1953) discussed the same species as a factor in control of cockroaches in Ohio. However, very little is known of the native species, some of which parasitize *Parcoblatta* wood roaches common in the eastern forests. Some work on the eastern species was presented by Edmunds (1952a, b, 1953, 1954). Although the four native species differ morphologically, they all have a similar flight period and occur in the same habitats. Presumably, there are ecological, biological, and/or behavioral traits that also support species differentiation.

MATERIAL AND METHODS

Collection sites, years of trapping, and numbers of traps used at those sites are as follows: MARYLAND: Prince George's Co., Beltsville Agricultural Research Center (1991–1993, 3–4 traps each year); Garrett Co., Finzel Swamp, 1 km S Finzel (1992–1993, 1–2 traps each year); Allegany Co., Green Ridge State Park, 6 miles E Flintstone (1991–1992, 4 traps each year). VIRGINIA: Louisa Co., 4 miles S Cuckoo (1985–1989, 4–12 traps each year); Fairfax Co., near Annandale (backyard trap) (1981–1996, 1 trap each year); Essex Co., 1 mile

S Dunnsville (1991–1996, 15–25 traps each year); Clarke Co., University of Virginia Blandy Experimental Farm and State Arboretum of Virginia, 2 miles S Boyce (1990–1995, 5–11 traps each year). WEST VIRGINIA: Tucker Co., Fernow Experimental Forest, south of Parsons (1991–1993, 20 traps each year); Hardy Co., 3 miles NE Mathias (1994–1996, 2–3 traps each year).

I used Townes-style Malaise traps for collecting (Townes 1972). Most collections were in 95% ethyl alcohol; potassium cyanide was used only in those traps at Green Ridge State Park, Maryland. Traps were run continuously through the collecting season, from the first part of March to mid-November in the more southerly and lower elevations sites (Essex Co., Fairfax Co.), and from mid-March to the first part of October at the other sites. I serviced the traps every ten days to two or three weeks depending on the weather and time of season. The total number of traps varied each year and at each site, usually from 20 to 30, but the same number and location of traps was kept constant for each site during each season.

In the records sections, county records are given for the mid-Atlantic states. For my collection sites, inclusive dates of collection and numbers of specimens are given in parentheses. The total number of species examined are those from my collection sites and are the basis for the graphs (Figs. 21–24). Specimens are deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Both sexes can be identified with the following key. For synonymy and references to original descriptions see Townes (1949) and Carlson (1979). State records in the distribution section are from these two sources plus more recent records of specimens I have examined.

KEY TO SPECIES

1. Forewing with one closed cell (Fig. 1) 2
- Forewing with 7 or 8 closed cells (Fig. 2) 4
2. Punctures on frons close, interspaces ridgelike

- and less than half diameter of punctures (Fig. 12); lower lateral portion of propodeum striate, mesopleuron without distinct punctures (Fig. 18); head in front view with lower interocular distance about equal to eye height (Fig. 6) *Hyptia harpyoides*
- Punctures on frons farther apart, shining flat interspaces usually equal to or more than puncture diameters (Figs. 13, 14); lower lateral propodeum with large punctures and mesopleuron with 1 or 2 large medial or postero-medial punctures (Figs. 19, 20); head in front view with lower interocular distance about equal to or less than eye height (Figs. 7, 8) 3
3. Mesopleuron with one or two large central punctures (Fig. 20); head in front view with lower interocular distance subequal to eye height (Fig. 8); lower swelling of mesopleuron with numerous punctures (Fig. 20) *Hyptia thoracica*
- Mesopleuron with large puncture in median posterior corner (Fig. 19); head in front view with lower interocular distance shorter than eye height (Fig. 7); lower swelling of mesopleuron with only a few large punctures (Fig. 19) *Hyptia reticulata*
4. Head smooth, shining, without sculpture (Figs. 3, 9); lateral surface of thorax and propodeum with widely scattered punctures (Fig. 15) *Evania appendigaster*
- Head sculptured (Figs. 4, 5, 10, 11); lateral surface of thorax and propodeum with numerous closely set punctures (Figs. 16, 17) 5
5. Front of head and frons with longitudinal carinae (Figs. 4, 10); with carina below antennal sockets which extends posteriorly on each side (Fig. 4); eye in lateral view diagonal (Fig. 16) *Prosevania fuscipes*
- Front of head and frons punctate (Figs. 5, 11); without carina around antennal sockets (Fig. 5); eye in lateral view subparallel with posterior margin of head (Fig. 17) *Evaniella semacoda*

SPECIES DISCUSSIONS

Evania appendigaster (Linnaeus)
(Figs. 3, 9, 15)

Distribution.—Arizona, District of Columbia, Florida, Georgia, Louisiana, Massachusetts, Missouri, New Mexico, New York, Pennsylvania, South Carolina, Tennessee, Texas.

Records.—District of Columbia.

Hosts.—Reared from egg capsules of *Blatta orientalis* L. and *Periplaneta* spp. (Townes 1949). Recorded from household

cockroaches *Blatta orientalis*, *Periplaneta americana* (L.), and *Periplaneta australasiae* (F.) (Stange 1978).

Discussion.—This species is found only in urban areas. I have never collected it in the field. A District of Columbia record of June 5, 1879, is the earliest known Nearctic record of this introduced species. It is probably of Oriental origin (Townes 1949) but occurs in most tropical and subtropical regions of the world. It is most common in Arizona and the Gulf Coast and Atlantic states. I have seen only several other specimens, all from the District of Columbia, collected July 30, 1911, and March 3, 1945. See Huber (1920) and Stange (1978) for biological information. This is the least common of the two introduced species.

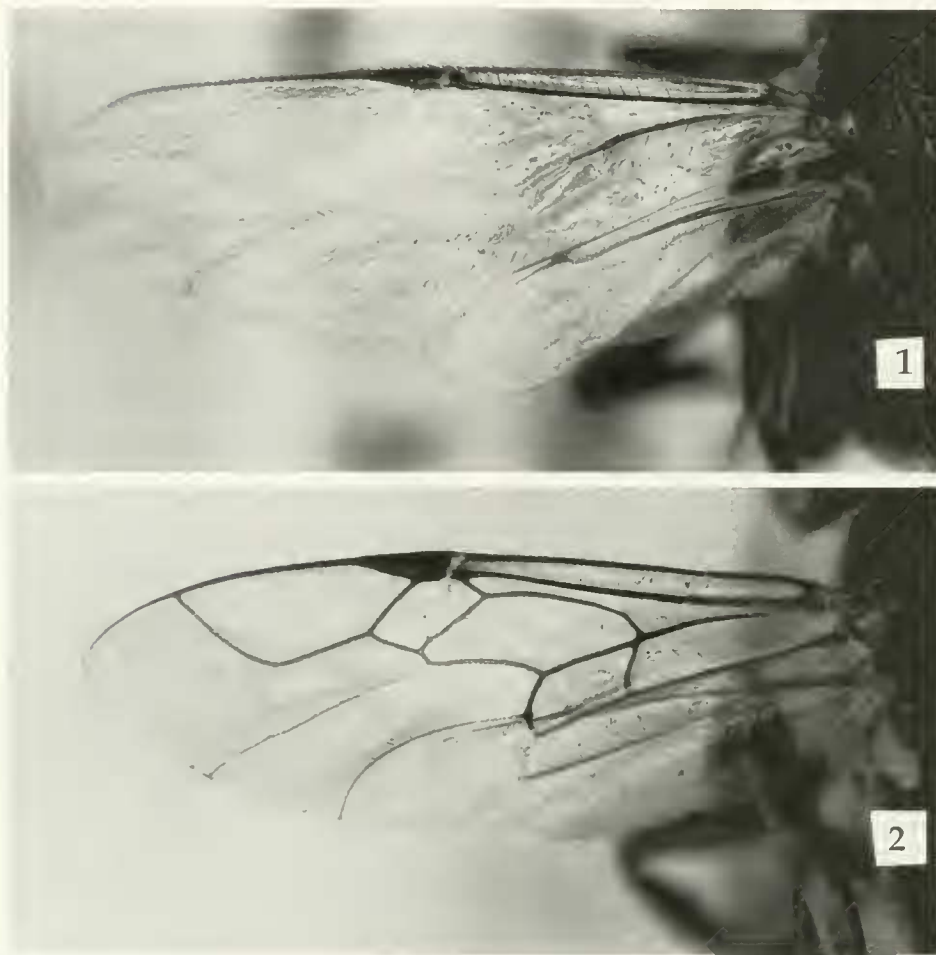
Prosevania fuscipes (Illiger)
(Figs. 4, 10, 16)

Distribution.—Delaware, District of Columbia, Georgia, Massachusetts, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Virginia.

Records.—Delaware: New Castle Co. District of Columbia. Maryland: Montgomery Co.; Prince George's Co.; Washington Co. Virginia: Arlington Co.; Fairfax Co.; Henrico Co.; City of Norfolk; Roanoke Co.

Hosts.—*Blatta orientalis* L., *Periplaneta americana* (L.), recorded by Carlson (1979).

Discussion.—This introduced species of Mediterranean origin (Townes 1949) occurs only in urban areas of the east coast. I have never collected it in the field. The first record of capture in the Nearctic Region is August 29, 1898 from Washington, D.C. It has been collected from June to October, but most collection dates are in July and August and most records are on windows and/or in buildings. This is much more common than the other introduced species, *Evania appendigaster*. Biological data are presented by Edmunds (1952a, b, 1953, 1954) and Thoms and Robinson (1986, 1987) who discussed this species as a potential biologi-



Figs. 1-2. Wings. 1, *Hyptia harpyoides*. 2, *Evaniella semaeoda*.

ical agent for household cockroaches in Virginia.

Evaniella semaeoda Bradley
(Figs. 2, 5, 11, 17, 21)

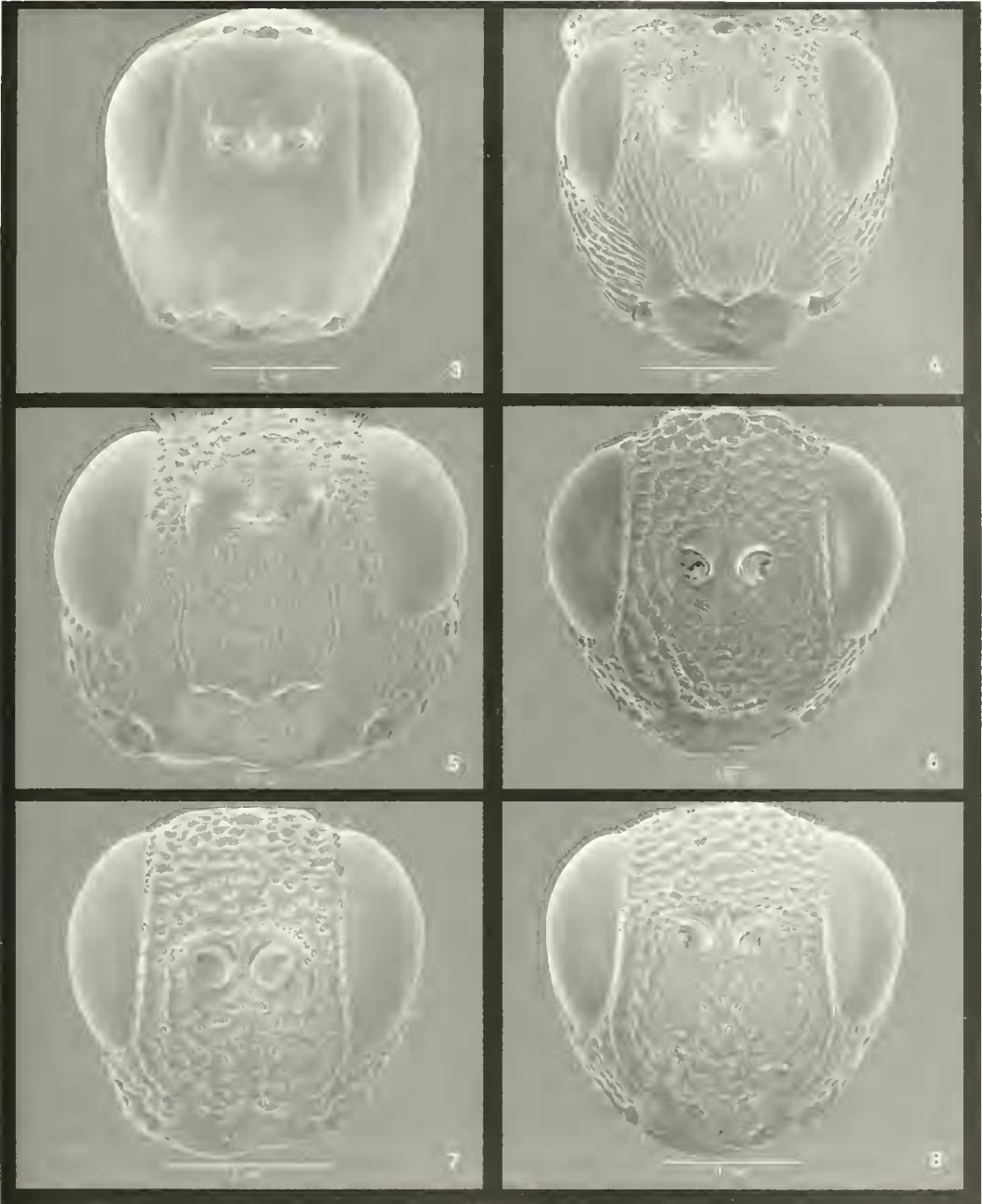
Distribution.—District of Columbia, Florida, Georgia, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Missouri, New Jersey, New York, North Carolina (Brimley 1938), Pennsylvania, Rhode Island, Virginia, West Virginia.

Records.—District of Columbia. Maryland: Allegany Co., 29-31.V (2); Montgomery Co.; Prince George's Co., 4.VI-29.IX (203). Virginia: Accomack Co.; Clarke Co., 12.VI-27.VIII (132); Essex

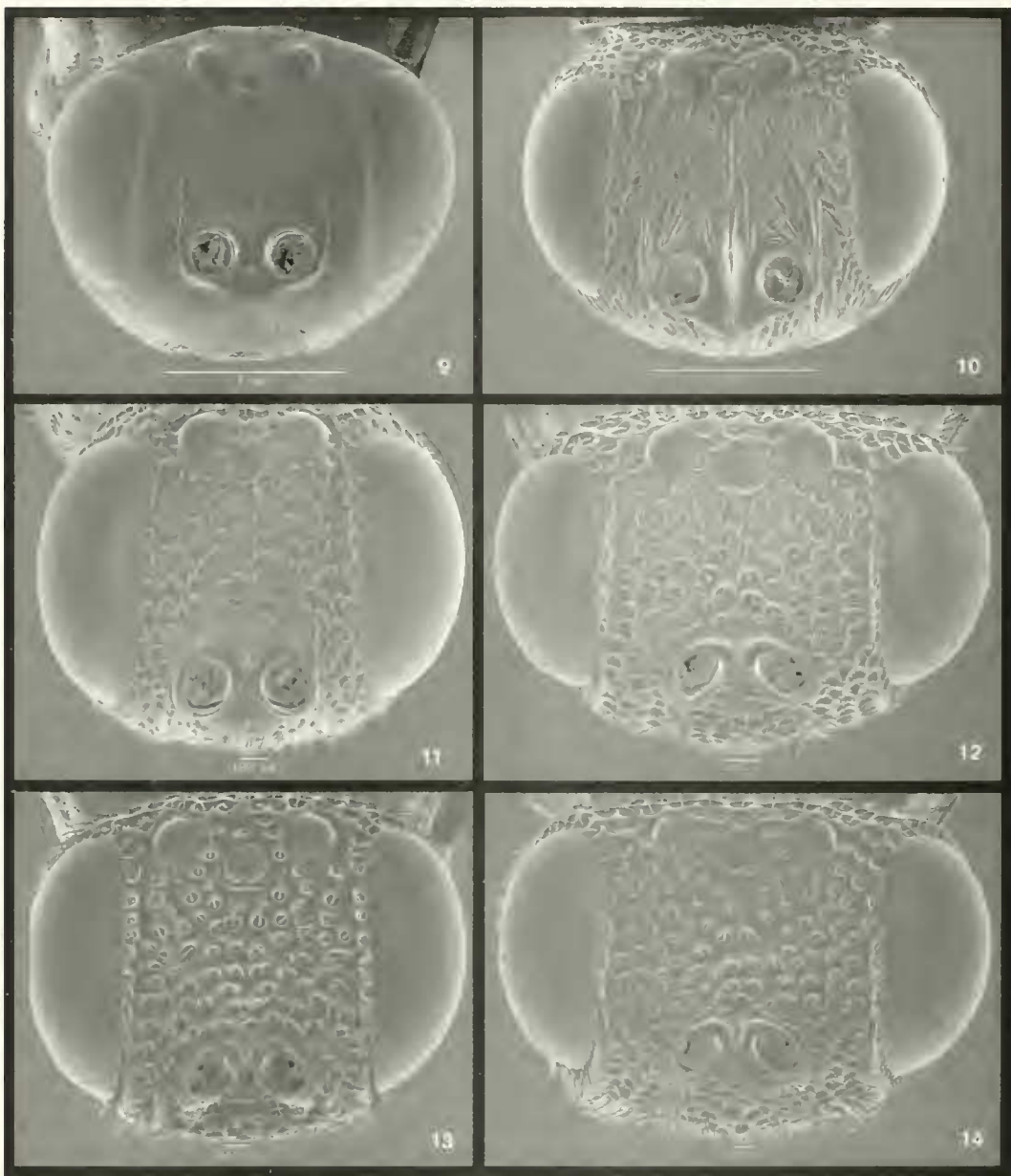
Co., 25.V-28.IX (1853); Fairfax Co., 23.VI-8.IX (38); Louisa Co., 16.V-7.X (345). West Virginia: Tucker Co., 20-29.VI (1). Total specimens: 2562.

Hosts.—Unknown.

Discussion.—This was the second most common species collected, especially from traps set inside woods and forests and at woods edges. It was rare at the higher elevation sites in West Virginia and western Maryland; only one specimen was taken in Tucker Co., West Virginia, where 20 traps were used in each of three years. Adults were collected at flowers "*Xolisma ligustrina*." The seasonal occurrence is shown in Fig. 21.



Figs. 3–8. Front view of head. 3, *Evania appendigaster*. 4, *Prosevania punctata*. 5, *Evaniella semaeoda*. 6, *Hyptia harpyoides*. 7, *H. reticulata*. 8, *H. thoracica*.

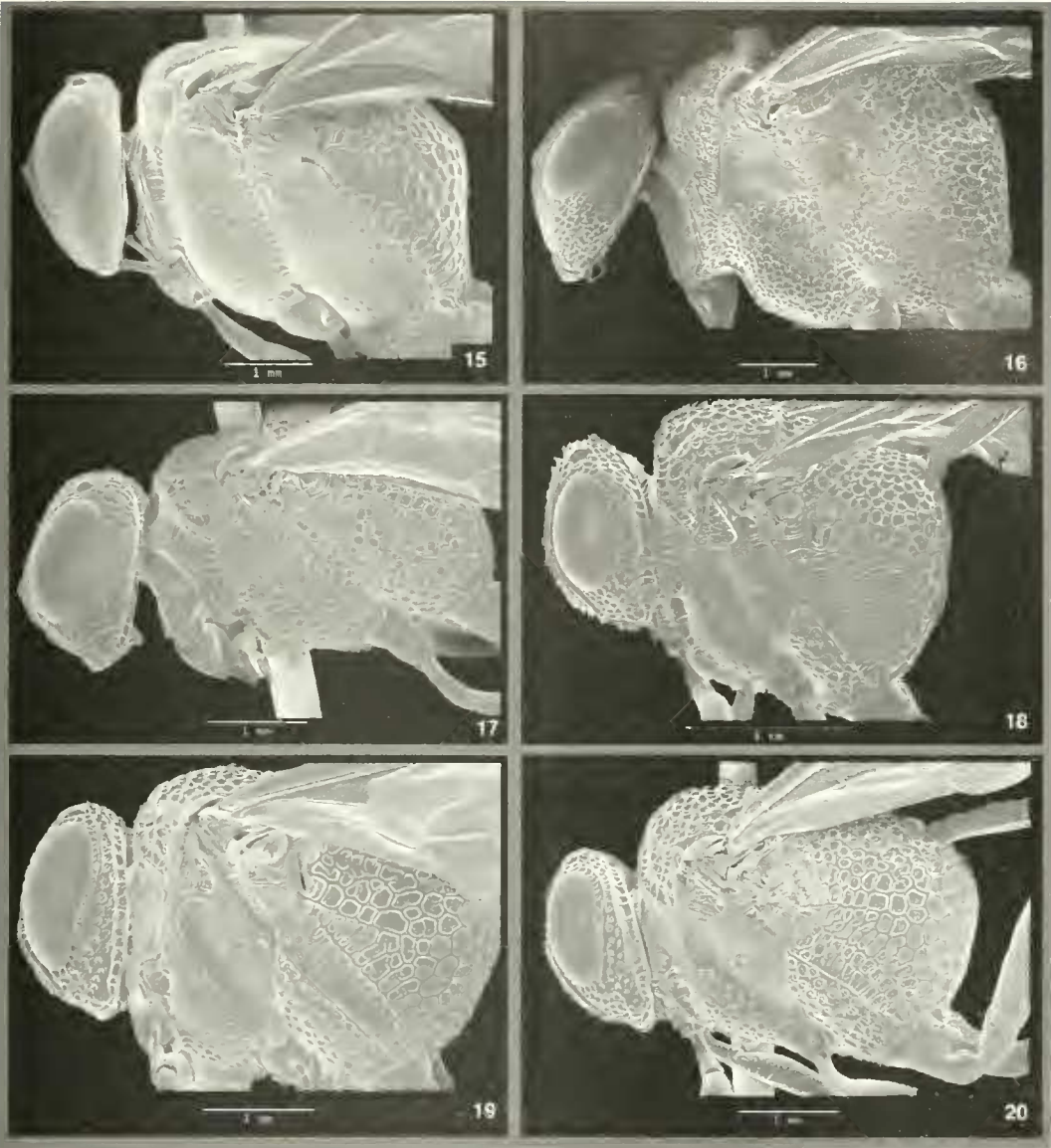


Figs. 9–14. Head, view of frons. 9, *Evania appendigaster*. 10, *Prosevania punctata*. 11, *Evaniella semaeoda*. 12, *Hyptia harpyoides*. 13, *H. reticulata*. 14, *H. thoracica*.

Deyrup and Atkinson (1993) recorded this species from April to November in southern Florida, with peak periods from May to October, most in August to October. It was the least common species at the site.

Hyptia harpyoides Bradley
(Figs. 1, 6, 12, 18, 22)

Distribution.—Connecticut, District of Columbia, Georgia, Illinois, Kansas, Maryland, Massachusetts, Michigan, Minnesota, Missis-



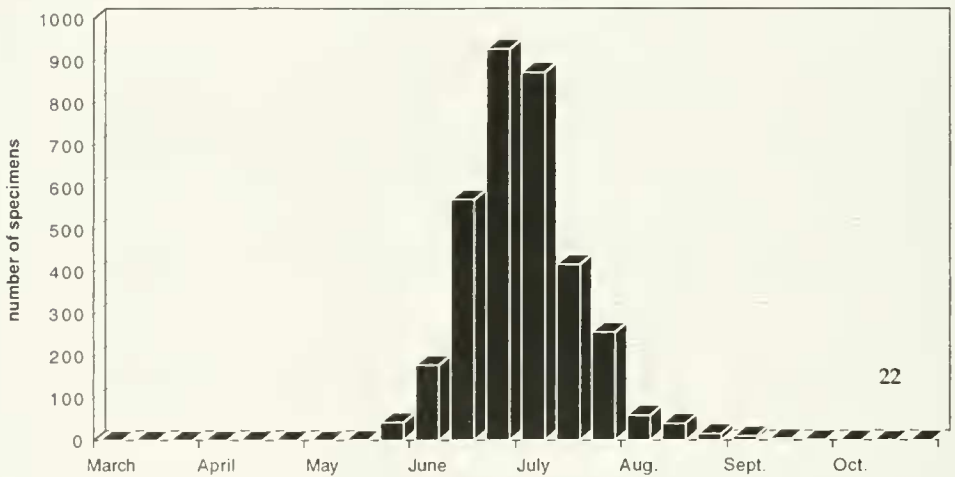
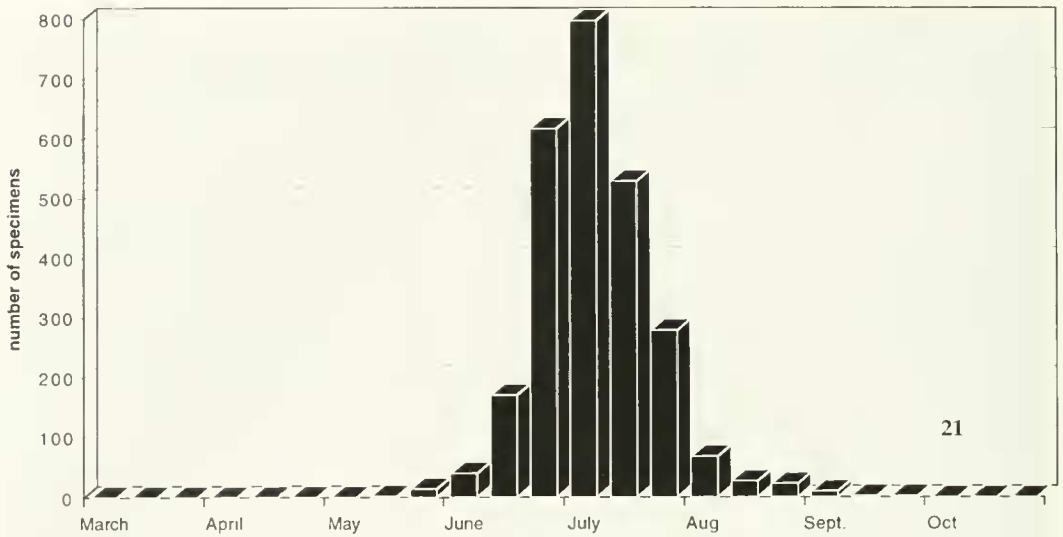
Figs. 15–20. Lateral view of head and thorax. 15, *Evania appendigaster*. 16, *Prosevania punctata*. 17, *Evaniella semaeoda*. 18, *Hyptia harpyoides*. 19, *H. reticulata*. 20, *H. thoracica*.

sippi, New Hampshire, New Jersey, New York, North Carolina, Ohio, Ontario, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Virginia, West Virginia.

Records.—District of Columbia. Maryland: Allegany Co., 10–20.VI (1); Garrett Co., 10–19.VII (1); Montgomery Co.; Prince George's Co., 16.V–29.IX (400); Worcester Co. Virginia: City of Chesapeake;

Clarke Co., 22.V–27.VIII (469); Essex Co., 14.V–16.IX (2066); Fairfax Co., 31.V–26.VIII (92); Louisa Co., 23.V–18.IX (397); Loudon Co., Roanoke Co. West Virginia: Hardy Co., 2–23.VI–12–25.IX (112). Total specimens: 3332.

Hosts.—*Parcoblatta uhleriana* (Saunders), *P. virginica* (Brunn.) recorded by Carlson (1979).



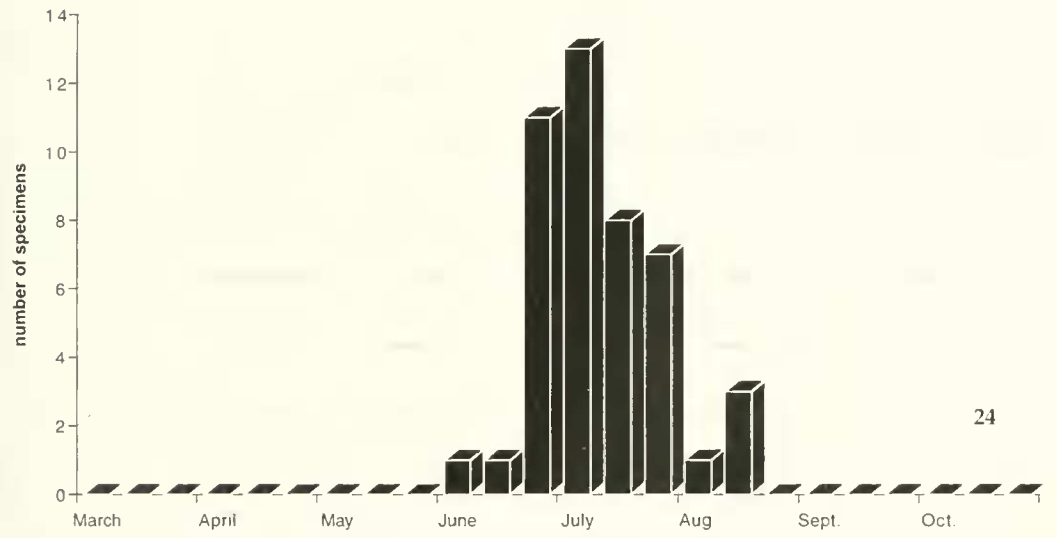
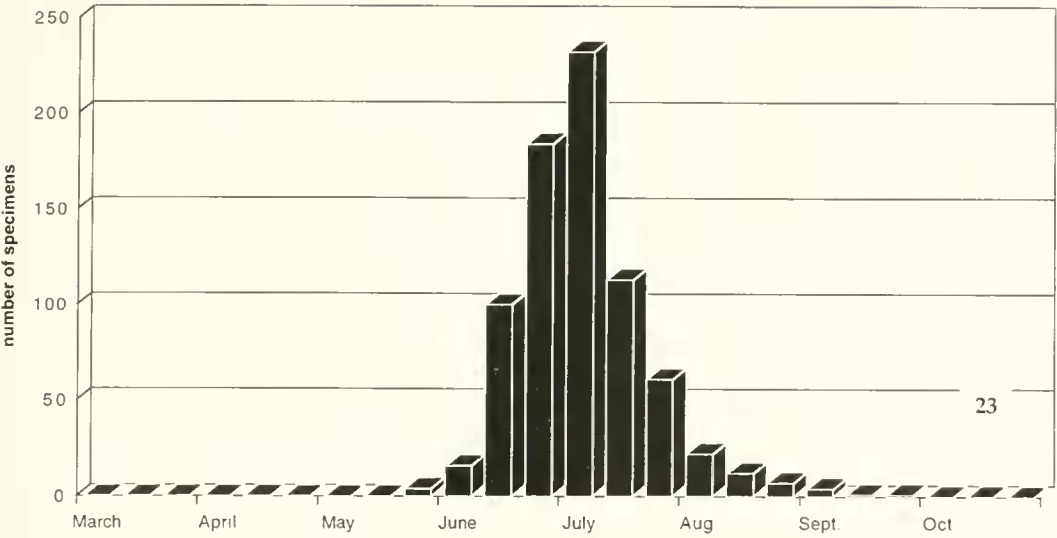
Figs. 21–22. Seasonal flight records. 21, *Evaniella semaeoda*. 22, *Hyptia harpyoides*.

Discussion.—*Hyptia harpyoides* is common in northeastern United States, and only one of two evaniids that occur in Canada. It has a more northern distribution than other species in the Nearctic Region. It was common in traps in woods and the most common species of Evaniidae collected. As with *Evaniella semaeoda*, it is more common at lower elevations and rather rare at higher elevations in West Virginia and western Maryland. The seasonal occurrence is shown in Fig. 22.

Adults have been collected “at honeydew.”

Hyptia thoracica (Blanchard)
(Figs. 8, 14, 20, 23)

Distribution.—Connecticut, District of Columbia, Florida, Georgia, Indiana, Kansas, Maryland, Massachusetts, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Ontario, Pennsylvania, Quebec, Rhode Island, South Carolina, Texas, Virginia, Wisconsin.



Figs. 23-24. Seasonal flight records. 23, *Hyptia thoracica*. 24, *H. reticulata*.

Records.—District of Columbia. Maryland: Prince George’s Co., 24.V–14.VIII (50). Virginia: Arlington Co., Clarke Co., 8.VI–7.VIII (56); Essex Co., 25.V–28.IX (620); Fairfax Co., 24.VI–11.VIII (4); Louisa Co., 8.VI–22.VIII (26). Total specimens: 750.

Hosts.—Two specimens in the National Museum of Natural History, Smithsonian Institution, were reared as follows: ex ootheca *Parcoblatta pennsylvanica* (Kirk-

wood, Missouri); and emerged ex ootheca *Parcoblatta* sp. (Vienna, Virginia).

Discussion.—This species was more common at the Essex Co. site than at the others. It was absent from the sites in West Virginia and western Maryland. Adults have been collected at honeydew, on “*Solanum carolinense*” (Solanaceae) and on trunk of diseased pine. The seasonal occurrence is shown in Fig. 23.

Deyrup and Atkinson (1993) recorded this species from March to December in southern Florida, with peak flights from July to October. It was the most common species at the site. Goulet (1994) recorded it from Quebec which is the most northern record.

Hyptia reticulata (Say)
(Figs. 7, 13, 19, 24)

Distribution.—Florida, Georgia, Louisiana, Maryland, Massachusetts, Mexico, Michigan, New York, North Carolina, Pennsylvania, Texas, Virginia.

Records.—Maryland: Allegany Co., 1–9.VI–9–18.VIII (4); Montgomery Co.; Prince George's Co., 14–24.VI (1). Virginia: Fairfax Co.; Louisa Co., 16.VI–23.VIII (41); City of Virginia Beach. Total specimens: 46.

Hosts.—Unknown.

Discussion.—This species is less common than the other species of *Hyptia*. It was most common at the Louisa Co. site. Adults have been collected at "tulip tree honeydew." The seasonal occurrence is shown in Fig. 24.

Deyrup and Atkinson (1993) recorded this species from April to October in southern Florida, with peak flight in June and July. It was the second most common species at the site.

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